



APRIL/MAY 2025

23UBC41 — BIOCHEMICAL TECHNIQUES

19. Explain how UV-visible spectrophotometry is used for enzyme assays and structural studies of biomolecules.
20. Discuss the principle, working mechanism, and applications of Geiger-Muller counters in the detection and measurement of radioactivity.

Time : Three hours

Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define standard hydrogen electrode.
2. Write the Henderson-Hasselbalch equation and its significance.
3. Differentiate between adsorption and partition chromatography.
4. What is the principle of thin-layer chromatography (TLC)?
5. List the factors affecting electrophoretic mobility.
6. What are the applications of SDS-PAGE?
7. State Lambert-Beer's law.
8. Define transmittance and absorbance.

9. Mention two biological applications of radioisotopes.
10. What are the different types of radioactive decay?

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions.

11. (a) Apply the Henderson-Hasselbalch equation to calculate the pH of a buffer system.

Or

- (b) Analyze the differences between differential and density gradient centrifugation.

12. (a) Explain the instrumentation and applications of affinity chromatography.

Or

- (b) Compare and contrast paper chromatography and thin-layer chromatography in terms of principles and efficiency.

13. (a) Describe the construction and working of Tiselius moving boundary electrophoresis.

Or

- (b) Analyze the advantages of agarose gel electrophoresis over paper electrophoresis.

14. (a) Explain the working of a colorimeter with a labeled diagram.

Or

- (b) Differentiate between UV and visible spectrophotometry in terms of principle and application.

15. (a) Explain the principle and working of a liquid scintillation counter.

Or

- (b) Analyze the impact of radioactive isotopes in biological studies.



SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Evaluate the role of buffers in maintaining physiological pH in biological systems.
17. Design an experiment using ion-exchange chromatography to separate proteins based on charge.
18. Analyze the factors affecting electrophoretic mobility and their implications in molecular separation.